ASSESSORS' HANDBOOK
SECTION 502

THE INCOME APPROACH TO VALUE

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Reprint Note

This manual has been renumbered from AH 501A, and renamed The Income Approach to Value.

This manual has been reprinted with a new format and minor changes for spelling and math errors. The text of the manual has not changed from the prior edition. It has **not** been edited for law, court cases or other changes since the original publication date.

FOREWORD

Discussion of the Income Approach to Value was previously included as part of Assessors' Handbook section 501, *The General Appraisal Manual*. Over the years, the complexity of the income approach has increased to the degree that it is now necessary to publish a separate section of the Assessors' Handbook dealing with the subject.

This text expands on the income approach as previously discussed in Assessors' Handbook section 501 and includes mortgage equity techniques using the Ellwood method. The appendix includes a section on terminology used in the income approach, two others for mortgage equity symbols, and a bibliography.

Some of the traditional techniques covered in this text may not conform to the methods typically used by investors in the current market. They have not been omitted, however, because they are still applicable to some appraisal situations.

This handbook will provide the journeyman appraiser with a thorough grounding in the fundamentals of the income approach to value. Specialized applications of this approach are covered elsewhere in the Assessors' Handbook.

This handbook was prepared by staff of the Assessment Standards Division, and the efforts contributed by Messrs. Ronald Hayashi and David Hendrick were significant in preparation of this publication.

The California Assessors' Association reviewed and approved the contents herein. Members of the State Board of Equalization approved the Assessors' Handbook Section 502 for inclusion to the Assessors' Handbook series on April 1, 1988.

Verne Walton, Chief
Assessment Standards Division
April 1988

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CHAPTER 1: THE CONCEPT OF THE INCOME APPROACH

The income approach to value may be defined as any method of appraising that converts an income stream into an estimate of value. This broad definition includes any use of monthly or annual gross or net multipliers of income as well as more refined methods. Refined methods convert income into value mathematically by summing the present values of each periodic payment of an income stream. The income approach may be called the capitalization method because capitalizing is the process of converting an income stream into a capital sum, i.e. value.

The refined income approach is an appraisal tool that employs more complicated mathematics than the other approaches to value. It must be used with discretion, however, because the capitalization process is sensitive to variations in its several elements. A small difference in the capitalization rate will produce values that differ by many multiples of the rate differential. The process is also sensitive to variations in income and expenses, although less so than to variations in rates. In addition, the process is sensitive to variations in duration of income. Variations affecting short durations have significantly greater impact upon value than those for long durations. Such sensitivity provides ample reason for exercising care when developing the several elements in the process. Appraisers must not become so impressed with the mathematics of the process that they attribute a greater than warranted degree of accuracy to this approach. In reality, accuracy can be no greater than the validity of the judgments (assumptions) incorporated in the process. Mathematics is employed to convert judgments into conclusions, not as a substitute for judgment.

CHAPTER 2: BASIC ASSUMPTIONS

VALUE IS A FUNCTION OF INCOME

A basic assumption of the income approach is that property is purchased for the money income it will yield. It follows that a property's value depends upon the income it will produce. This assumption is generally accepted in the appraisal of most commercial, agricultural, and multiple-residential properties because the owners of these properties frequently are not the users. For example, the landlord of a store property owns it for the rental income received and a potential purchaser would buy it for the expected future income. This is an important assumption and, in cases where it does not correspond with the actual facts, the approach has a lesser degree of validity.

In order to use the income approach, the benefits a property returns over time must be expression in terms of money. Accurate benefits expressed in money can be most easily determined for commercial, agricultural, and multiple-residential properties because these are frequently leased to tenants in a competitive market. Single-family residential properties, on the other hand, may also be leased and provide income data, but they are most often developed and held to provide their owners with amenity rather than money benefits. Consequently, appraisers almost always find it difficult to obtain reliable income data for these properties.

Should the income approach be used on property which provides both monetary and amenity benefits, great care must be exercised in converting amenity benefits into value. If the capitalization rate reflects the amenity benefit, the question arises whether the amount of amenity benefit reflected in the rate equals the amenity benefit in the subject property. For example, a farm may be both a production unit returning money benefits and a living unit returning amenity benefits. Because the appraiser is often unable to impute a money income to the amenities from the living unit, a capitalization rate is derived from market data which is based **only** upon the money income derived from the farm as a production unit. The capitalization rate will consequently be **lower** than it would have been had it been possible to impute a money income to the amenities, and by adding the income from both benefits, obtain a more accurate measure of the true monetary return. Capitalization rates that include both monetary and amenity elements should be used only on properties that have amenities similar to those of the properties from which the rates were derived.

The income that is to be processed must be the expected future economic income **from the property to be appraised.** An ordinary commercial retail store that is operated by the property owner involves at least two businesses. One is the business of owning the real property, and the other is the business of selling merchandise. Since the owner's income reflects both property earnings and business earnings, it is necessary to allocate a portion of the operation's expected future earnings to the business of owning the property being appraised.

Rents are, in effect, selling prices for short-term rights to use property. Appraisers apply these short-term rights to use property. Appraisers apply these short-term selling prices in the income approach to obtain value indicators, which are nothing more than the sum of the present worths of all expected future short-term selling prices. The sum may involve short-term selling prices for a terminating period or for perpetuity.

PROPERTY VALUE IS AFFECTED BY THE DURATION OF INCOME AND THE LIKELIHOOD OF ITS RECEIPT

The income approach assumes that the investor in real property will estimate the duration and quality of the income stream. For land, the duration is usually perpetuity, but improvements have limited lives. The estimation of the remaining economic life of improvements (that period of time over which the property will earn a net income above the rent imputable to the land) is important in the income approach and requires careful analysis. Average life tables have been developed as general guides to estimating remaining economic life, but a careful study of the structural soundness of the improvements, the degree of functional obsolescence, and the economic and social trends in the neighborhood and community should serve as the primary basis of this estimate.

The likelihood of not receiving the expected income is expressed as "risk." The less assurance there is of receipt of the income, the higher the rate at which the future expected income is discounted. A failure to achieve the anticipated income flow causes a loss in the value of the investment. Since not all investments are subject to the same degree of risk, not all investment income flows are discounted at the same rate.

Investors anticipate both a return **of** (recapture) and a return **on** (yield) their investments. The yield necessary to attract money to a particular investment is in part a function of the risk perceived. Yield contains components for time, liquidity, risk, and investment management.

A PROPERTY'S FUTURE INCOME IS LESS VALUABLE THAN ITS PRESENT INCOME

A third assumption of the income approach is that future income is less valuable than present income. It follows that future income must be discounted to equate it to present income. The capitalization process is a method of discounting future income to find its present value.

A series of equal payments made at equal intervals is known as an annuity. The present value of an annuity is the sum of the several separate periodic incomes, discounted to their respective present worth.

The process of discounting any future payment of money to obtain the present worth of income (the indicated market value of the property producing the income), is called "capitalization." The

components of the discounting process are: the money income to be discounted, the rate at which it is to be discounted, and the time over which the income is to be realized.

In its simplest form, this process may be represented by the equation $V = \frac{I}{R}$, where V is the indicated present worth of the income stream, I is the income to be capitalized, and R is the capitalization rate. If the time over which the income is to be realized is less than perpetuity, a recapture component must be included in R. Applying basic mathematical principles, if any two elements of this equation are known, the third can be found. For example, if the rate and value of a property are known, the income can be determined; if the income and value of a property are known, as in the case of a sold property, the capitalization rate can be determined.

Prepared tables are available for annuities of limited duration or deferred income payments. These tables contain factors that account for the terminating nature (recapture) of the income stream. Since the recapture is included in the factor, the capitalization rate must not include a component for recapture. The basic capitalization formula than becomes V = F x I rather than $V = \frac{I}{R}$. In this method, capitalizing a terminating income stream or a single payment to be received in the future is simply a matter of multiplication.

The choice of capitalization formula is determined by the shape of the income stream. The appraiser must know the basic capitalization equations and understand the relationship between the various components of these equations before proceeding to the mechanics of the capitalization process.

SUMMARY

The income approach to value is based upon three major assumptions:

(1) people purchase property for its expected future money income;

(2) future income is less valuable than an equal amount of present income; and

(3) investors estimate the duration and quality of the income.

If these assumptions do not correspond to the way in which investors purchase property, then the use of the income approach is questionable.

CHAPTER 3: PROCESSING INCOME

Once the appraiser accepts the basic assumptions of the income approach, the next logical step is to process the income to the point where it can be capitalized. The objective of this section is to explain the processing of gross income to net income.

POTENTIAL GROSS INCOME

The potential future annual gross income of the property must be estimated. Potential gross income is defined as the maximum income the property would yield if it were rented every day of the year at the income expected by the typical investor for rental of the unencumbered fee simple absolute rights. This means the contract rent negotiated by existing landlord and tenant may be adjusted by the appraiser to an economic rent, which is the rent that the property would command if a new lease were negotiated under competitive conditions on the date of the appraisal. Using actual contract rent instead of economic rent will, if they differ, result in an estimate of value that is not in line with current market conditions.

When appraising property that is subject to a lease agreement, the property tax appraiser ignores contract rent, a private agreement, and turns instead to economic rent. If, however, the rent is artificially low because of rent control, it is by government action that the rent is low and it cannot be ignored. Rent control is a restriction on property as certainly as a zoning ordinance is a restriction, and it must be recognized.

When rent control is encountered, the appraiser must become familiar with its limitations. Rent control ordinances may permit gradual rent increases over time, perhaps on the basis of the consumer price index or increases in operating expenses. The appraiser must make rent projections over the life of the improvements taking into consideration the life of the rent control ordinance and any rent increases permitted. Rent projections should be at the maximum permitted rent so long as that amount does not exceed economic rent.

The appraiser's objective is to estimate the economic rent for all property rights. Rent is economic in the sense that it reflects the foreseeable supply of and demand for such real estate in the future. Economic rent reflects the maximum earning power of the property in its particular market during its particular market during its productive life.

VACANCY AND COLLECTION LOSSES

A vacancy allowance is deducted from the gross income estimate. Virtually all properties will be vacant at some time during their remaining lives. If, in fact, a property does not experience vacancy, it may be that the a actual rent is too low. Even if this were not the case, it still would be correct procedure to deduct a vacancy allowance from the potential gross income of the property, since a prudent investor would anticipate some vacancy. A possible exception to this statement occurs in properties with very short lives.

Vacancy losses are usually combined with collection losses. Vacancy and collection losses are expressed as a percentage of potential gross income. This percentage is estimated on the basis of study of the subject property and an analysis of trends in the neighborhood and area.

EFFECTIVE GROSS INCOME

Subtraction of the vacancy and collection loss allowance from potential gross income yields "effective gross income," the annual income the investor can actually expect to receive. No expenses have been deducted, so it is still a gross income figure.

EXPENSES

The next step in the process is to subtract all expenses from effective gross income. The expense estimate, like the income estimate, should not necessarily be current or average past expenses, but an estimate of what expenses the prudent investor may reasonably expect during the remaining life of the property. Expenses, like income, should be estimated on an annual basis.

What expenses are properly deductible? The general rule is that all expenses of the property necessary to maintain the flow of income are deductible. Maintenance and insurance charges are two expenses deductible in virtually all improved properties. Insurance premiums may be prepaid in three-year premium format; if this is so, only one year's premium should be allowed as an operating expense. Operating expenses such as salaries, utility costs, gardening, janitorial services, and other outlays necessary for operation of the property are deductible. When payment of the gross rental entitles the lessee to the use of furniture, fixtures, and office equipment not included in the property to be appraised, the annual cost of replacement and repairs, taxes, and a market rate of return on the value of such items is deductible

Property management expenses can be controversial, particularly when an owner does not completely manage his own property. In this case, there may be two levels of management expenses: those involving hired management and those incurred directly by the property owner. The latter may be more properly termed "administrative" expenses. Owners take varying degrees of responsibility in the management of their property, but all management expenses are a legitimate deduction when they are necessary for the operation of the property, regardless of who incurs them.

There are many items of real property such as water heater, stoves, etc., that must be replaced periodically in intervals much shorter than the economic life of the structure. If income and expenses were separately estimated, year by year, the full cost of these replacements would be treated as expenses for that year in which they were expected to occur.

One method of determining an annual allowance for deferred replacement involves the use of the sinking fund technique. In this method, money is assumed to be set aside and earning interest

during the interval between replacements. The sinking fund technique is not generally used by those who purchase and sell property.

Another method is to estimate the replacement cost of the item and to discount that cost as a single future payment for the number of years remaining prior to replacement. This present worth is then deducted from the capitalized value of the property. The appraiser should use this technique to establish replacement reserves when it reflects the behavior of typical investors in the property.

The sinking fund method is preferred if the amount of the income diverted to the sinking fund is expressed as a percent of gross income. In this way, inflationary increases in the cost of replacing the item may be approximately compensated for by inflationary increases in rent.

Some items considered expenses by the accountant are not considered expenses by the appraiser, For instance, payments on a trust deed are not property expenses for appraisal purposes They are merely indications that the property is encumbered.

Accountant's depreciation ("book" depreciation) also is not an allowable expense for appraisal purposes. Depreciation, as used by the accountant, is the recapture of a previously incurred outlay.. Since the appraiser is not concerned with past expenditures, he seeks to estimate what value **future** income will recapture. For the appraiser to accept the accountant's depreciation charge as an expense means he is accepting the sum to be recaptured as the value. Such reasoning would be incorrect. No item that assumes the answer to the problem should be deducted as an expense. For example, if the appraiser allows a $2,000 straight-line recapture and a 50-year life, the appraiser has assumed a building value of $100,000. Only by incorporating recapture in a capitalization rate or using a factor that incorporates remaining economic life does the appraiser avoid this assumption.

Property taxes are one of the controversial items in the processing of income. Assessors should not treat property taxes as an expense. The purpose of the assessor's appraisals is to estimate a value for property tax purposes. If current property taxes are subtracted as an expense, the value of the property is assumed. Since the property tax equals the tax rate times the assessed value, the calculation of taxes necessarily involves an assumption that the appraiser knows the assessed value and hence, the market value. If he knows the value, there is no point in making the appraisal. The reasoning is parallel to the reasoning on recapture. No item which assumes the answer can be set up as an expense. This point has been addressed by the courts (see *DeLuz Homes, Inc*., v. *County of San Diego,* 45 Cal. 2d 546 (1955).

Of course, an **allowance** must be provided for recapture and property taxes. The various ways of allowing for recapture are explained in the section on methods of capitalization. The allowance for property taxes must be provided by adding a property tax component to the capitalization rate. For example, if the future tax rate is estimated at one and one-half percent, then the correct allowance for taxes is one and one-half percent. A one and one-half percent inclusion in the

capitalization rate will automatically provide for property taxes equal to one and one-half percent of the value of the property.

Federal and state income taxes, whether individual or corporate, are not a deductible expense. These taxes are based on a corporation's or an individual's total income rather than income specifically earned from the ownership of real property, and it is almost impossible to allocate a portion of this tax to a specific property. In any case, when a capitalization rate is derived from actual sales, using incomes prior to the deduction of income taxes, and the rate applied to incomes at the same level, these taxes are properly accounted for because the rate reflects income taxes recognized by the market.

SUMMARY

The appraiser follows a standard form in processing income. All income and expense items are analyzed on an annual basis, and all items represent future economic incomes and expenses. Expenses attributable to the property are deductible, but personal expenses are not. Income and property taxes, mortgage principal and interest payments, and recapture are not deductible as expenses. Recapture and property taxes are accounted for in the capitalization rate.

The following is an illustration of the procedure to follow in processing income.

Potential gross income		$10,000
Less vacancy and collection allowance (5%)		- 500
Equals effective gross income		$ 9,500
Less expenses of		
Maintenance	$800	
Insurance	+ 400	
(assuming no other expenses)		- 1,200
Equals net income before recapture and property taxes (NIBR&T)		$ 8,300

CHAPTER 4: DERIVATION OF CAPITALIZATION RATES AND MULTIPLIERS

A capitalization rate is any rate used for conversion of income into value. In appraisal of real property, future income is discounted to present value at a rate that reflects the premium of present money over future (time), liquidity, investment management, risk, taxes (if appraised for assessment purposes), and recapture if applicable. The capitalization rate is a hoped-for or expected rate of return on and of the investment. It is the rate necessary to attract capital to the investment.

In an unrestricted economy, an economic balance is established among all types of investments. Once this balance is established, a relative decline in real estate yield (return on) would lead to a decline in activity in the real estate market. Conversely, a relative increase in real estate yield tends to stimulate additional investment. These market forces interact until a balance is restored. The capitalization rate for a given property is the result of the interaction of market forces.

MARKET DERIVED RATES AND MULTIPLIERS

Market analysis is the preferred method of obtaining capitalization rates. Actual selling prices (reduced to cash equivalents) of comparable properties can be related to the anticipated income. Similarly, when the total costs incurred in developing a new property are known, a rate can be derived from the relationship between the total investment and the investors' anticipated income. The income used in rate analysis must be the investors' anticipated income, for an investment in property is directly related to the anticipated return. Several types of rates can be obtained by using different levels of income to derive them.

As we have previously stated, a variation of the basic capitalization equation is $R = \frac{I}{V}$. Where we know V (the sale price of the property), and I (the income attributable to the property) the derivation R becomes a simple mathematical computation. The selling price of the property is the stable element in the equation. The rate will vary according to whether the income processed is gross or net.

Regardless of the type of rate used in the capitalization process, the rate must be applied to the **same** level of income from which it was derived. For example, an overall rate derived from a net income prior to deduction of recapture must be applied to net income prior to deduction of recapture.

Anticipated appreciation and income tax advantages affect property values and often result in apparently low yield rates. When analyzing sales of property for the purpose of deriving rates or multipliers (or for any other reason), it is necessary for the appraiser to understand the anticipations and motives of both the buyer and the seller. For example, suppose in an analysis of the sale of a rented property, a yield rate is found that is substantially less than typical. If the buyer anticipated a large increase in rent, the analysis should be based on the actual selling price and

anticipated rent. Then the analysis is based on anticipations that resulted in the negotiated price and would probably show a more typical yield rate. Sales of farm land in California for many years had shown yield rates that were very low in relation to rates that were common in other classes of property. Although the yield on investment appeared low, the purchaser has the option of operating the farm and receiving **both** the operating profit **and** the yield on investment. Furthermore, there had also been an expectation that farm land values would appreciate, an expectation that has usually proved to be justified. Income from appreciation that has usually proved to be justified. Income from appreciation, of course, is taxed as a capital gain.

Income tax considerations can also be of primary importance in real estate transactions and, in some cases, the purchase price can be of secondary importance. Accelerated book depreciation techniques used on a building that has a positive cash flow can, for income tax purposes, actually show a book negative cash flow thus sheltering the owner's income from the building and other income as well. An analysis of the sale of such property may very well be more reflective of the property's income tax advantages than of the property's yield on investment.

Appraisers should be aware of income tax considerations relating to property ownership and take them into account when analyzing sales.

GROSS INCOME MULTIPLIERS

When gross income is used in the capitalization process, the relationship between I and V is usually expressed as a gross income multiplier (GIM) rather than a rate. A multiplier is expressed in the basic formula $\text{GIM} = \frac{\text{V}}{\text{I}}$.

The gross income to be processed is the maximum **anticipated** earning capacity of a sold property, not necessarily the existing income at the time of sale, and the multiplier is derived by dividing the selling price of the property by this gross income. For example, if a property were sold for $200,000 and the gross annual earning capacity of this property were $25,000, the gross income multiplier would be $200,000 ÷ $25,000, or 8. In other words, the value of the sold property is 8 times its gross income. A multiplier can also be derived from the effective gross income of property in a similar manner. This multiplier can be applied to the economic incomes of unsold but otherwise comparable properties to produce indicators of the values of these properties. Gross income multipliers are easily derived and applied, but they should be applied only when properties are extremely comparable, for anything that makes the relationship of net income to gross income vary between properties will distort the value estimate. Cost and market approaches to value should be used to check the values produced by GRM or GIM analysis.

The terms "gross income multiplier" and "gross rent multiplier" are often used interchangeably. It is probably not **wrong** to do so since the appraisal profession has not yet precisely defined the terms, but their apparent evolution should provide a guide to their use.

The gross rent multiplier no doubt was first used on single-family homes. Years ago, 100 times monthly rent was a good guide to residential values. When a multiplier began to be used to value

more complex properties, gross **income** had to be used to account for both rent and any other income, and it had to be on an annual basis to allow for possible seasonal fluctuations in income. But whatever their history, generally the term "gross rent multiplier" (GRM), connotes monthly rent earned by the principal improvement, while "gross income multiplier" (GIM), infers annual income for all sources.

OVERALL RATES

An overall rate is the ratio of net income before a deduction for recapture to the value of a property. The income used is anticipated gross income less anticipated vacancy and collection losses and all anticipated operating expenses, but prior to deduction of recapture. In this case, the operating expenses include the amount of property tax **anticipated** by the buyer, for a property tax component will be added to the overall rate to form a capitalization rate. For example, if a property that was sold for $200,000 was capable of producing a gross income of $30,000 per year, an overall rate could be derived as follows:

Anticipated gross income	$30,000
Less anticipated vacancy and collection allowances (3%)	- 900
Anticipated effective gross income	$29,100
Less anticipated expenses (including anticipated property taxes)	+10,000
Anticipated net income before a deduction for recapture	$19,100
Overall rate: $19,100 ÷ $200,000 = .0955 or 9.5%	

This rate expresses the relationship between the value of the **entire** property and the income stream. There is no separate consideration of depreciation of improvements as opposed to land. This has a limiting effect upon the application of an overall rate, because it can be used only in the appraisal of properties that are highly comparable to the properties from which the rate was derived. The ratio of land to improvement value and the remaining life of the improvements are particularly important in this comparison.

YIELD RATES

A yield rate is the anticipated annual percentage rate of return on investment. It can be derived from the market using methods that account for the method of recapture perceived by the market such as the annuity capitalization method (the level or constant terminal premise) or the straight-line declining income premise. It is important that correct recapture perceptions are utilized, because the resulting yield rate is dependent on those perceptions.

The derivation of a yield for the annuity capitalization method is a trial and error technique because two unknowns are involved: The yield rates for land and for improvements. For example, a property which sells for $600,000 is anticipated by the buyer to gross $70,000 per year, with a remaining economic life of 30 years, and the land value is $250,000; vacancy and collection losses

run 5 percent and an expense ratio of 20 percent of effective gross income is anticipated; taxes are anticipated to be 1.2 percent of the purchase price. The yield derivation is as follows:

Anticipated gross income	$70,000
Less vacancy and collection losses	- 3,500
Effective gross income	$66,500
Less operating expenses	- 13,300
Net income before recapture and taxes (NIBR&T)	$53,200
Less anticipated taxes	- 7,200
Net income before recapture (NIBR)	$46,000

Try 8%

NIBR	$46,000	8% is not correct, because $292,702
Less land income	20,000	is not what was paid for the building
Income to building	$26,000	($600,000 - $250,000 = $350,000). A
Times PW of $1 per period		lower yield rate must now be tried.
@ 8%-30 years	11.257783	
	$292,702	

Try 6%

NIBR	$46,000	Since the building value has exceeded
Less land income	15,000	the $350,000 paid, the yield rate must
Income to building	$31,000	lie somewhere between 6 and 8
Times PW of $1 per period		percent.
@ 6%-30 years	13.764831	
	$426,710	

Try 7%

NIBR	$46,000	The result at 7 percent just barely
Less land income	17,500	exceeds the $350,000 that was paid
Income to building	$28,500	for the building, so the yield rate lies
Times PW of $1 per period		just slightly above 7%.
@7%-30 years	12.409041	
	$353,658	

Try 7 1/4

	$46,000	The result indicates that 7¼ percent is
NIBR	18,125	too high for a yield rate and cannot be
Less land income	$27,875	narrowed using standard tables.
Building income	12.103663	
Times PW of $1 per period		
@ 7 ¼ %-30 years	$337,390	

Using preprinted tables with quarter percent increments, a yield rate of slightly above 7 percent has been established. Further refinement, if needed, can be accomplished by interpolating the yield rates in relation to the resulting building values. For extreme accuracy, the precise yield rate (7.06 percent) may be determined with the aid of a financial calculator.

Market derivation of a yield rate using a straight-line declining terminal income premise is done if the market recognizes this method of recapture. This method is similar to the annuity capitalization method only to the point of net income before recapture. Using the same information as for the annuity capitalization method, the following example is illustrated:

Net income before recapture	$46,000
Less recapture charge $350,000 ÷ 30 years	11,667
Net income	$34,333
$34,333 ÷ $600,000 =	.057 = 5.7%

This example illustrates that once the allowance for recapture of improvements is made, the income to land and buildings is weighed against the total investment to derive a yield rate.

The yield rate contains components for time, liquidity, investment management, and risk. But the capitalization rate must also provide for the return of that portion of the investment that declines in value (recapture). This method of recapture is a matter of market perception, and this subject is discussed in the section on **Methods of Capitalization.** Capitalization rates used to appraise property for tax purposes will also include a component for property taxes, a subject previously discussed.

BAND OF INVESTMENT DERIVED RATES

YIELD RATES

A yield rate can be determined by the band of investment method if sales of comparable property have not occurred. This method is based on the premise that the total property yield rate is the weighted average of the return on the different portions of the investment. The portions are the debt and equity investments that apply to a property, and the respective yield or return rate each portion attracts. Debt consists of a first mortgage and perhaps a second or third mortgage. The appraiser can determine current rates for mortgage money and the portion of the total property sale price covered by the mortgage. The expected rate of yield on equity is more difficult to

estimate, and this is the basic weakness of the method. However, as long as the equity investment portion is low, it does not affect the yield rate as significantly as does the mortgage portion.

As an example of investment derivation, assume that a buyer could finance 80 percent of the purchase price of a property with a loan at 8 percent interest. In addition, the buyer expects to receive a 12 percent return on equity. The weighted average of these different components can be computed as follows:

	% of Sale Price		Loan Interest/Yield Rate
Debt component	80	x	.08 = .064
Equity component	20	x	.12 = .024
Total property yield rate			.088 or 8.8%

This method of rate derivation is most valid when the expected return on equity is based on market analysis. When a yield rate can be derived from sales of properties with similar investment potential and current interest rates and loan ratios are known, the equity return can be extracted using the same basic mathematical technique employed in the yield rate derivation. For example, assume that the appropriate yield rate extracted from the market is 8.8 percent, and mortgage money is available at 8 percent interest for 80 percent of the purchase price of a property:

Total property yield rate	.088
Debt component (.80 x .08)	.064
Equity component	.024
Rate of return on equity = .024 ÷ .20 = .12	

Of course, if a yield rate can be derived directly from the sales of similar properties, there is no point in developing a yield rate by the band of investment method. However, many times equity yield can be derived from sales of properties that are not closely comparable to the subject but are similar in their investment potential. The expected rate of return on equity may be applicable to a broad range of properties even though the terms of available debt financing may vary.

OVERALL RATES

Derivation of an overall rate by a band of investment technique is conceptually the same as a band of investment yield rate, the only difference being that for the financed portion of the investment a mortgage amortization constant is used, and for the equity portion of the investment a cash flow rate (see glossary) is used. The mortgage amortization constant ("mortgage constant", "constant annual percent", "annual constant", etc.) is the annual amount of debt service required on a loan that is paid in equal monthly installments and is expressed as a percentage of the original loan amount. Its use in conjunction with a cash flow rate indicates the investor's total cash flow requirements from the investment on an annualized basis.

As an example of an overall rate derivation, assume the following facts: 30 year loan at 10 percent interest for 75 percent of the property sale price, fully amortized, level monthly payments. Equity is expected to receive a 5 percent rate of cash flow annually.

	% of Sale Price		Mortgage Constant/ Cash Flow Rate
Loan	.75	x	.1053086 = .0790
Equity	.25	x	.05 = .0125
Overall Rate			.0915

As in a market derived OAR, this rate includes provisions for recapture but not for property tax. For valuing a comparable property, a property tax component should be added prior to capitalizing NIBR&T into value.

MORTGAGE-EQUITY OVERALL RATES

There are two basic techniques of mortgage-equity overall rate development: the band of investment method used by Charles Akerson and the algebraic formula developed by L. W. Ellwood. While the procedure for deriving any overall rate may differ, the rates derived are the same if the specified financial assumptions and investment requirements are similar. This is true for band of investment, market derivation, and the so-called mortgage equity methods. Here the terms of the mortgage (loan) and the required equity return are directly considered in deriving an **overall** rate. The band of investment yield rate is the equivalent of the mortgage-equity overall rate **only** when an investment is financed with an "interest only" loan and there is no expected change in property value. With this type of financing, the value of a property is the full value of the loan plus the value of the equity. If there is no change in the total value of the property, there is no change in this relationship of equity and debt throughout the life of the loan. When a recapture component for the wasting assets is not required, the yield rate and the overall capitalization rate are the same.

LOAN AMORTIZATION AND EQUITY BUILD-UP

"Interest only" loans are seldom made in real estate transactions. Most mortgage loans require periodic principal payments in addition to interest. The usual method of repayment involves periodic equal payments that amortize the principal and pay interest over the life of the contract. An allowance for principal reduction can be made using a mortgage constant for the terms of the loan. This constant may be defined as the periodic level payment needed to amortize and pay interest on a loan over the stipulated term, expressed as a percent of the original loan principal.

Using this rate in the band of investment method, we can derive an overall rate for an amortized loan. For example, assume an 80 percent loan at 8 percent interest for 20 years, payments to be

made in equal monthly installments, containing both principal and interest, and an expected equity yield of 12 percent. A rate can be developed as follows.

Debt component (.80 x .1003728)	.0803
(.1003728 equals mortgage constant @ 8% for 20 years-monthly payments)	
Equity component (.20 x .12)	+.0240
Weighted average	.1043 or 10.43%

If this loan were to be paid with equal **annual** payments containing principal and interest, instead of monthly payments, the annual mortgage constant would be the appropriate "amount to amortize" factor for annual compounding. Mortgage constants can be found in most capitalization tables, including Assessors' Handbook section 505.

This weighted average rate can be used to capitalize net income into a value estimate, but it does not necessarily reflect long-term prospects of a true yield. It is based on the relationship of equity and debt (20 percent and 80 percent) that exists at the beginning of the loan term. It does not take into account the constantly changing relationship between these two factors. As loan payments are made, the equity portion grows and debt portion declines. This changing relationship would not be significant if the interest rate on debts, and the return rate on equity were the same, but normally an investor desires a rate of return on equity that is higher than the interest rate he pays. Over a period of time, this results in a build-up in equity that must be recognized if an accurate overall rate is to be derived. An adjustment is made by **deducting** a credit for equity build-up from the previously established overall rate. The deduction is necessary because the component for amortization , included in the previously established overall rate, is too high. If the borrower made annual deposits in a separate debt retirement fund recieving 12 percent interest, the costs to duplicate debt retirement would be **less** than indicated in the overall rate.

The equity build-up adjustment is computed using a sinking fund factor. A sinking fund factor provides the periodic deposit required to accumulate one dollar in a given number of periods when the deposit earns interest at a given rate. In other words, it is the portion of the value of the loan that must be deposited periodically at a given interest rate to reach the full value of the loan at the end of the stated term. This factor must be applied only on the debt portion of the weighted average. Using the same terms previously stated, an adjusted overall rate is computed as follows:

Debt component	.0803
Equity component	+.0240
Weighted average	.1043
Less credit for equity build-up	
.80 x .013879	
(.013879 = sinking fund factor, 12% for 20 years)	-.0111
Basic rate (full loan term)	.0932

ADDITIONAL RATE REFINEMENTS

An unrefined band of investment yield rate presumes an "interest only" loan that does not require a gradual reduction of principal, and this rate is not based on any definite term. The refined capitalization rate developed in the preceding paragraph is based on the full term of the loan and would not be valid for a term less than this.

In a sophisticated real estate market, investors often sell their properties after only five to ten years to minimize income taxes and to maximize the returns of their investments. Where a limited term is a consideration of the market, it is necessary to adjust the basic rate for the appropriate holding period. An adjustment for a holding period less than the full term can be estimated by changing the computation of the credit for equity build-up. The sinking fund factor used in this computation must be for the shorter period of time, and it must be multiplied by the percentage of the loan that would be paid off during this shorter period. Using the same mortgage term and equity yield given in previous examples, we can now compute a capitalization rate for an investment that is to be held for ten years.

Debt component .80 x .100373	.0803
Equity component .20 x .12	+.0240
Weighted average	.1043
Less credit for equity build-up	
.3106 x .80 x .056984	-.0142
.3106 = portion of the loan that has been paid after 10 years of an 8% 20 year loan.	
.80 = loan % of original investment	
.056984 = sinking fund factor for 10 years 12%	
Basic rate (10 year term)	.0901

This rate is higher than the yield rate (8.8 percent, page 14) and lower than the full-term adjusted basic rate (referenced above).

One other market consideration can be incorporated in mortgage-equity overall rate analysis. The rate can be adjusted for anticipated depreciation or appreciation of the property during the holding period. As in any type of rate adjustment, anticipated depreciation can be accounted for by adding a recapture allowance to the previously computed rate. Conversely, anticipated appreciation can be accounted for by subtracting an allowance from the basic rate. The sinking fund concept is used for this adjustment.

We have already used the sinking fund concept to adjust for equity growth from loan amortization. Because the owner of the equity received all the benefits of property appreciation, or suffers all the losses from depreciation, we can adjust the overall rate for this element by adjusting the same basic sinking fund factor used in our equity build-up analysis. The adjustment procedure is simple. The estimated percentage loss or gain that is anticipated during the holding period is multiplied by the sinking fund factor used for the previous equity growth adjustment. Using the same basic data in our previous example, but anticipating a 10 percent appreciation in value during the 10 year holding period, we derive the adjustment as follows:

Sinking fund factor for 10 years @ 12%	-.056984
Times total property appreciation	x .10
Annualized property appreciation	-.0057
Plus Previously established rate for	
a 10 year holding period	+.0901
Final overall rate	.0844

The adjustment was subtracted because the property was appreciating in value. Remember, capitalization at a low rate produces a higher value than capitalization at a high rate (assuming no change in income).

ELLWOOD MORTGAGE-EQUITY TECHNIQUE

The mortgage-equity concept has been explained using the Akerson method because it is a simpler method to understand. The Ellwood method is not as concise for explanation purposes because some of the steps have been combined mathematically. The results are the same using either method The major advantage of the Ellwood technique is that when calculating overall rates, many shortcuts can be taken using the Ellwood tables which have various factors precalculated and/or grouped together for convenience.

The basic Ellwood equation is:

$r = Y_E - MC$

Where:

r = Basic capitalization rate

Y_E = Equity yield rate

M = Mortgage ratio

C = Mortgage coefficient

$1/S_{\overline{n}|}$ = Sinking fund factor at the equity yield rate for the full term of the loan

$1/S_{\overline{p}|}$ = Sinking fund factor at the equity yield rate for the projected holding period

P = Fraction of the loan paid off in the projected holding period

Using this equation, a sample problem can be illustrated. Assume that typical investors are purchasing properties with 80 percent loans at 8 percent for 20 years, and are expecting a 12 percent equity yield rate. Based on this information, a basic capitalization rate can be computed with the following information:

$Y_E = 12\%$

$M = 80\%$

$C = Y_E + (P \bullet 1/S_{\overline{p}|}) - R_M$

$1/S_{\overline{p}|} = .013879$

Therefore:

$r = Y_E - MC$

$r = .12 - .80\ [.12 + (1.0 \bullet .013879) - .1003728]$

Basic Rate (full loan term)= .0932

Even though the technique is entirely different, the basic rate is the same as with the Akerson Technique. This basic rate does not take into consideration the shorter period that many investors hold properties.

If a 10 year holding period is used with the basic rate of .0932 calculated above, a slightly different rate results.

$$P = \frac{R_{M-I}}{R_{MP-I}} = \frac{.100373 - .08}{.145593 - .08} = .310597$$

$$C = Y_E + (P \bullet 1/S_{\overline{p}|}) - R_M$$

$$= .12 + (.310597 \bullet .56984) - .100373$$

$$r = .037326$$

$$r = Y_E - MC$$

$$= .12 - .80\ (.037326)$$

Basic rate (10 - year term) "r" = .0901

Again, even with a different technique, the same basic rate as computed with the Akerson method results. (See page 17).

One additional adjustment that can be made is for appreciation or depreciation during the holding period which has a symbol of Δ "delta." Where the expectation is for appreciation, delta has a negative sign. For depreciation it has a positive sign. Assuming in the previous example there is a 10 percent appreciation over the holding period the formula can become either:

$$R = r - \Delta \bullet 1/S_{\overline{p}|}$$

or

$$R = Y_E - MC - \Delta \bullet 1/S_{\overline{p}|}$$

Therefore:

$$\Delta = .10$$

$$R = r - .10 \bullet 1/S_{\overline{p}|}$$

$$R = .0901 - (.10 \bullet .056984)$$

$$R = .0844$$

This overall rate can be used to capitalize an income stream whenever the rate is appropriate.

The advantages of the Ellwood method are not readily apparent, but with a set of Ellwood tables an overall rate can quickly be found with fewer calculations required.

The Ellwood tables include a table of "mortgage coefficients" for various loan interest rates, equity yield rates, loan terms, and holding periods. These coefficients can be used for any loan ratio and eliminate the need to calculate "P" (the percentage of the loan paid off during the projection holding period), and "C" (the mortgage coefficient).

For loans of 66⅔ and 75 percent of purchase price, basic capitalization rates are precalculated, allowing additional shortcuts for valuation and investment analysis.

The mortgage-equity technique for developing overall rates has been used extensively in investment analysis for some commercial properties, but only sparingly in the appraisal of property for tax purposes. For a mortgage-equity overall rate to be valid in property tax appraising, the components of the rate should be determined from market data. Making this determination is the basic problem in applying the technique.

To compute a mortgage-equity overall rate, the terms of the available financing, the holding period, the estimated change in property value during the holding period, and the equity yield must be known. The financial terms, the holding period, and the possible change in value can be estimated from market data, but the equity yield rate cannot be **directly** calculated, even when the overall rate is known. When the mortgage component (mortgage ratio x mortgage constant) is subtracted from a market derived overall rate and the remainder (the weighted equity rate) is divided by the equity ratio, the quotient is not the equity yield rate but rather the equity's cash flow rate (equity dividend rate). Since equity yield must be known to determine the sinking fund factor needed to adjust the overall rate, the equity yield rate must be calculated as shown. The rate can be determined by a trial and error method.

Equity yield rate	=	Equity dividend rate	+ (Equity appreciation rate) or - (Equity depreciation rate)	x	(Sinking fund factor at equity yield rate for holding period)

Example:
Assume that a property which was purchased eight years ago with an equity investment of $100,000 down can now be sold so that the investor received $150,000 after the loan is paid off and all sales expenses have been paid. During this period of ownership, a cash flow averaging $6,000 per year has been received. What equity yield rate has been received during this holding period?

Answer:

1. **Computation of Known Data**

Equity Divided (cash flow) Rate (R_E)	=	$ 6,000 / $100,000	=	.06
Appreciation	=	$150,000 -$100,000 / $100,000	=	.50

2. **Trial Rates**

Formula:	Y_E	=	R_E	+	(App • $1/S_{\overline{n}|}$)

Try	.09	=	.06	+	(.50 x .090674)
	.09	≠	.105337		(They aren't equal, so another rate must be tried between 9% and 10½%)

Try	.105	=	.06	+	(.50 x .085869)
	.1050	=	.1029345		

They are not equal, but most tables do not include factors between 10.3 percent and 10.5 percent. We can conclude that the true yield lies somewhere between 10.29 percent and 10.5 percent. We cannot approximate a closer result with quarter percent tables, but we can be sure that the true yield will more closely approximate 10.29 percent because the resultant yield rate usually changes less than the trial rate. (A financial calculator can be used to narrow down the rate, which, in this case, is 10.32 percent.)

CHAPTER 5: METHODS OF CAPITALIZATION

To convert net income before a deduction for recapture into value, some method of capitalization must be used. Accordingly, the purpose of this section is to explain the various methods that accomplish such conversions. This is done by describing the various methods on the basis of how they treat the duration and shape of the income stream. The chart on the following page illustrates the duration and shape of income streams.

CAPITALIZING A SINGLE INCOME PAYMENT

The discounting of a single income payment due sometime in the future to determine its present worth is the basic building block for all capitalization procedures, for any income stream is, in reality, a series of individual payments. This computation is easily done using a present-worth-of-one factor from any book of compound interest tables. To capitalize a single income payment, the income is multiplied by a factor for the present worth of one at the appropriate rate, including a tax component for the deferred period. This computation assumes that all the income will be received in one sum at the end of a period of time.

For an example of the process of determining for assessment purposes the present worth of a single payment, assume that the single payment prior to the deduction of taxes and recapture is $1,900, the property tax component is 1 percent, the yield rate is 8 percent, and the payment will be received 10 years from today. The present-worth-of-one factor for 10 years at a 9 percent rate is .422411, and the value is $1,900 x .422411 or $802.58.

GRAPHIC ILLUSTRATIONS OF THE METHODS OF CAPITALIZATION
Shapes of 4 Basic Income Streams

Figure 1

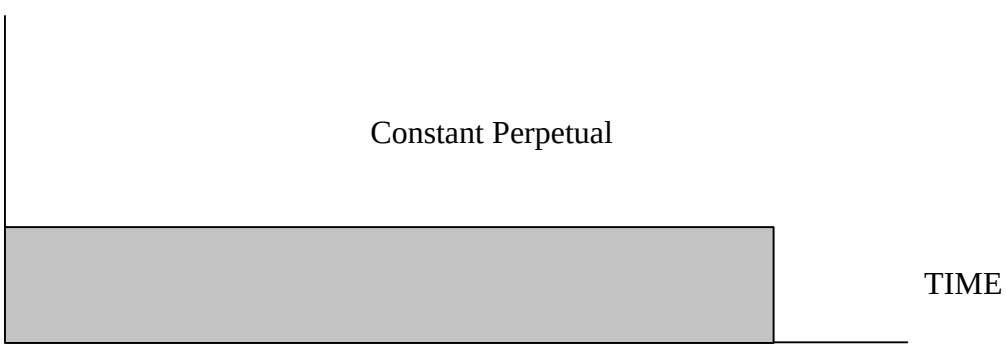


Figure 2

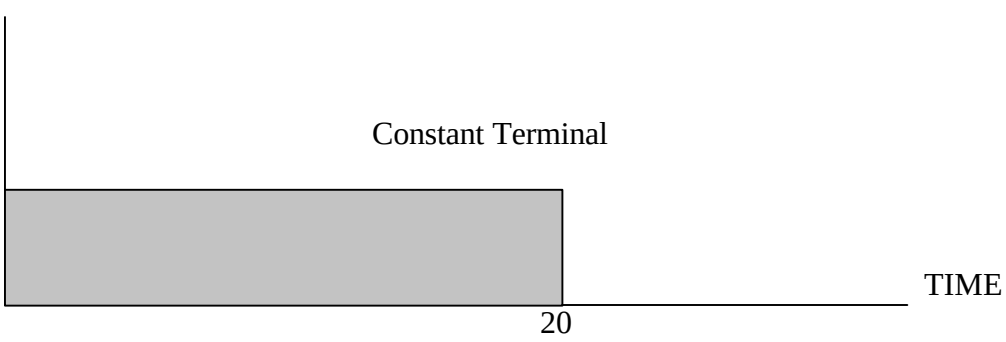


Figure 3

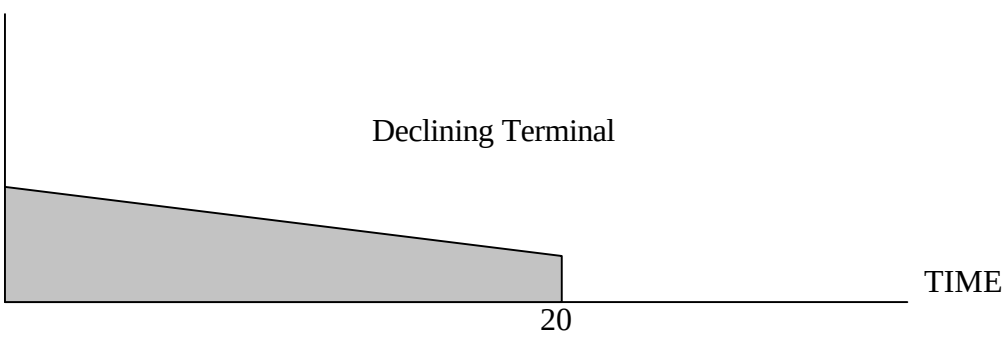
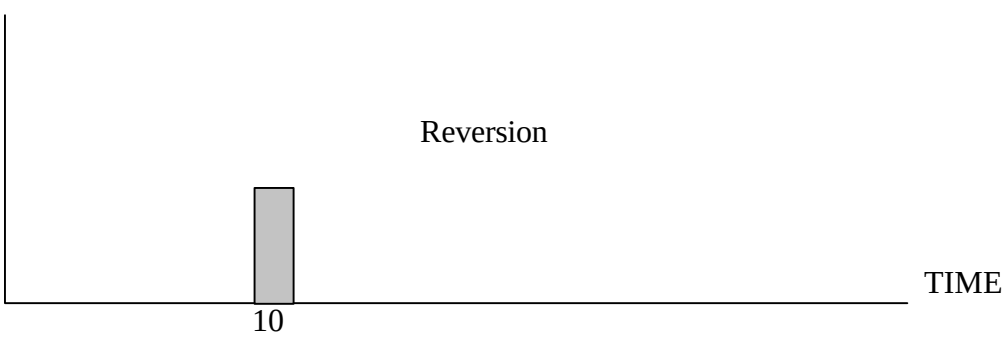


Figure 4



CAPITALIZING A PERPETUAL SERIES OF CONSTANT INCOME PAYMENTS

The income from a nonwasting asset is perpetual, and there is no need to provide for the recovery of capital when capitalizing this kind of income stream. This is the simplest capitalization method, and it is applied only to land. The procedure is to divide the NIBT by the capitalization rate; the quotient is the value. Net income prior to the deduction of property taxes ÷ capitalization rate (including tax component) = value; e.g., $8,100 ÷ .09 = $90,000. This method, like all other methods described in this manual, assumes that the first income and expense payments are realized one year after the date of the appraisal and annually thereafter.

CAPITALIZING A TERMINAL SERIES OF LEVEL INCOME PAYMENTS

In the case of a wasting asset, the income has a limited life. All of the methods of capitalization, except capitalizing a constant perpetual series of income payments, involve wasting assets. The remaining economic life, i.e., the period over which wasting will take place, must be estimated and provisions for the recovery of capital must be made.

For a level terminal income stream, the method shown in all contemporary appraisal texts is V = I x F, where value is equal to the net income before recapture multiplied by the factor for the present worth of one dollar per period at the selected capitalization rate. The factor provides recovery of capital for the remaining economic life of the improvement.

For assessment purposes, a slightly different approach can be taken to account for the property tax component. The net income before recapture and taxes (NIBR&T) is divided by the sum of the installment to amortize $1 factor (column 6, compound interest tables, Assessors' Handbook section 505) plus a property tax component, expressed as a percentage. The installment to amortize $1 factor, it will be noted, is the reciprocal of the present worth of $1 per period (column 5).

By including a component for property tax, the value of the property is not arbitrarily assumed in order to estimate a tax expense. The amounts allocated for recapture vary throughout the economic life of the asset and follow the same curve as principal repayment for a loan that has equal periodic payments for principal and interest, Taxes and yield have first call on income. Remaining amounts are used to recover the capital itself.

For example, assume that the net economic income produced by a wasting asset prior to a deduction for property taxes and recapture is $1,981 at the time of appraisal. The property tax allowance is 1 percent, the yield rate is 8 percent, and the remaining economic life is 10 years. The installment to amortize factor for 10 years at 8 percent is .149029. The value is $1,981 ÷ (.149029 + .01) or $12,457.

Under these assumptions, income is allocated as follows:

End Of Year	Year End Capital Balance	8% Sinking Factor	Recapture	8% Yield	NIBR	1% Property Taxes	NIBR&T
0	12,457						
1	11,597	.069029	860	996	1,856	125	1.981
2	10,668	.080080	929	927	1,856	116	1,972
3	9,665	.094015	1,003	853	1,856	107	1,963
4	8,582	.112072	1,083	773	1,856	97	1,953
5	7,412	.136315	1,170	686	1,856	86	1,942
6	6,149	.170456	1,263	593	1,856	74	1,930
7	4,784	.221921	1,365	491	1,856	61	1,917
8	3,310	.308034	1,474	382	1,856	48	1,904
9	1,719	.480769	1,591	265	1,856	33	1,889
10	0	1.000000	1,719	137	1,856	17	1,873
Total			**12,457**				

It is essential to remember that the installment to amortize factor consists of the desired yield rate plus the sinking fund factor at that yield rate for the remaining term. For purposes of this example, it is assumed the NIBR remains constant throughout the term. The recapture amounts and property tax amounts are based on the previous year's ending capital balance.

CAPITALIZING A TERMINATING SERIES OF STRAIGHT-LINE DECLINING INCOME PAYMENTS WITH STRAIGHT-LINE RECAPTURE

The straight-line declining income method assumes that the income will decline an equal amount each period. It also provides for equal recapture of the investment each period. The decline in income each period equals the amount recaptured times the sum of the yield and tax rates. The reciprocal of the remaining economic life (1 divided by the remaining economic life) is the mathematical formula for the annual allowance for the recovery of capital to be put into the capitalization rate. The NIBR&T divided by a capitalization rate that includes allowances for property taxes and recovery of capital produces the indicator of value.

For example, assume that the net income prior to property taxes and recapture is $1,900, the property tax allowance is 1 percent, the yield is 8 percent, andtheremaining economic life is 10 years. Then the recapture allowance is 1 ÷10 = 10%. The value is $1,900 ÷19% (i.e., 8% + 1% +10%) = $10,000.

This method allocates the income as follows:

End of Year	End of Year Capital Balance	Recapture	Taxes (1%)	Yield (8%)	NIBR&T
0	$10,000				
1	9,000	$1,000	$100	$800	$1,900
2	8,000	1,000	90	720	1,810
3	7,000	1,000	80	640	1,720
4	6,000	1,000	70	560	1,630
5	5,000	1,000	60	480	1,540
6	4,000	1,000	50	400	1,450
7	3,000	1,000	40	320	1,360
8	2,000	1,000	30	240	1,270
9	1,000	1,000	20	160	1,180
10	0	1,000	10	80	1,090

Since the anticipated NIBR&T declines by a constant amount per annum, it is a straight-line decline. The decline is equal to the capitalization rate less the recapture rate (19% - 10%) times the amount of capital recovered each year ($1,000), i.e., 9% x $1,000 = $90.

SUMMARY

The methods of capitalizing income are all recognized methods, but they will produce different answers even though all other conditions are unchanged. The problem that faces the appraiser is the determination of the proper method to use. The proper method to use must reflect the assumptions that fit the practices of the investors who constitute the market for the property that is being appraised. These are matters that must be estimated from the analysis of market data.

CHAPTER 6: APPLICATION OF CAPITALIZATION TECHNIQUES

DIRECT CAPITALIZATION

Direct capitalization is the simplest form of capitalization; it can be used to derive a total property value for a property composed of both land and improvements. In this application, the net income before a deduction for recapture and taxes (NIBR&T) attributable to the property is divided by a proper **overall** capitalization rate $\left(V = \frac{I}{R}\right)$. The overall rate expresses the relationship between the entire property value and its income stream; it contains built-in elements that recapture the wasting asset and any other factors considered by the market. When using an overall capitalization rate to appraise for assessment purposes, a tax component must be added to the overall rate prior to capitalization.

For example, assume a Net Income Before Recapture and Taxes of $10,000, an Effective Tax Rate of 1%, and an Overall Rate of 10-l/2%;

$$V = \frac{NIBR\&T}{ETR + OAR} = \frac{\$10{,}000}{1\% + 10 - ½\%} = \frac{\$10{,}000}{11 - ½\%} = \$87{,}000 \text{ (ROUNDED)}$$

The advantages of direct capitalization are: (1) the procedure is easily understood by the public, (2) it is based on market evidence, and (3) it is easy to apply. Of course, the property tax appraiser, when applying the method to an improved property, must also allocate the total property value between land and improvements, which presents an additional appraisal problem.

The disadvantage of this method is that a given rate is applicable only to closely comparable properties when improvements are involved. Because an overall rate contains a component for recapture of wasting asset and is used to capitalize all income generated by the property, the ration of land to improvement value becomes important in the rate application. A rate applicable to a property with a 50 percent land to building ration would not be applicable to a property where land value is a significantly greater or lesser portion of the overall value, even though the improvements are basically similar. The recapture of the wasting assets also requires that remaining economic life of the sold properties is comparable to that of the subject property. In other words, the selection of a proper average rate involves a high degree of appraisal judgment

In all capitalization techniques, rates derived from sales of comparable properties are preferred to mathematically developed rates when sufficient market data are available. When applicable market-derived rates are not available, rates can be developed through band of investment analysis.

The mortgage-equity technique capitalized the NIBR&T by an overall rate derived from analysis of the mortgage element and equity contribution in the typical real estate investment. This

mortgage equity overall rate can be refined in various degrees depending upon the requirements and anticipation's of real estate investors. These levels of refinement were described in the section on rate derivation.

Mortgage-equity analysis stems from a division of income-producing real property into its component mortgage and equity interests. Because such real property is most likely to be acquired and owned by a purchaser-investor who regards the property as an investment, this analytical division is considered descriptive of market behavior. The validity of mortgage-equity analysis rests on the assumption that the market value of an income property can be obtained by summing the present worth of the mortgage, and the present worth of the equity investment position.

The band of investment and mortgage-equity technique are used to estimate a rate when an applicable market-derived overall rate is not available. The appraiser must not be overwhelmed by the technique or the mathematics; an applicable market-derived rate is still preferable in appraising for assessment purposes.

RESIDUAL TECHNIQUES

BUILDING RESIDUAL

The building residual technique is used to process income into an indicator of building value when the income is from both land and buildings. The section on "methods of capitalization" has already established the reasons for the differences in capitalization methods for land and buildings. this technique will be discussed in terms of capitalizing both a straight-line terminating series of declining income payments for improvements and a constant terminal series of payments for improvements.

In the following examples, we assume that the income has been processed to a net income of $5,000 before recapture and property taxes, the remaining economic life of the building is 50 years, the building has no value at the end of the economic life, the proper yield rate is 8 percent, and the property tax allowance is 1 percent . In order to use this technique, the present land value must always be known.

Straight-Line Declining Terminal Income

The present land value is $20,000, then:	
NIBR&T in the first year	$ 5,000
Less income imputable to land: (9% of $20,000)	1,800
Income imputable to building	$ 3,200
Building value: $3,200 ÷ .11 (.08 + .01 + .02)	
(Recapture = 1/50 or .02)	$29,091
Land value	+ 20,000
Total property value	$49,091

The building residual technique assumes that the land value remains constant and the land income is a perpetual series of level payments. Since the value equals the income divided by the capitalization rate, the income must equal the value times the rate. The income imputed to the land is subtracted from the total property NIBR&T, and the residual income is imputed to the building. A straight-line declining income premise was used on the residual income in the preceding example, but any other income premise could have been used, providing the yield rate was developed from the same premise.

Level Terminal

Using the same facts as above, the building residual would be performed as follows:

NIBR&T	$5,000
Less land income: (9% of $20,000)	- 1,800
Building income	3,200
Building value: $3,200 ÷ .0917 (.0817 + .01)	$34,896
(Installment to amortize @ 8% for 50 years = .0817)	
Land value	+20,000
Total property value	$54,896

LAND RESIDUAL TECHNIQUE

This technique can be used to estimate a land value only when the building is relatively new and the property is improved to its highest and best use. The building must have suffered little or no depreciation. The technique is not proper for use in deriving a total property value. In order to use the land residual technique, the building value must be known. If it is $29,091, then:

Net income in the first year	$ 5,000
Less income imputable to building	
Building value: $29,091 x .11 (.08 + .01 + .02)	- 3,200
Income imputable to land	$1,800
Land value: $1,800 ÷ .09 (.08 + .01)	20,000
Building value	29,091
Total property value	$49,091

This example of a land residual procedure allows a return on and recapture of the building using a straight-line declining income premise. Given a rate and an income, value equals the income divided by the rate, or conversely, given the value and the rate, income equals the value times the rate. the income imputable to the building portion of the investment is subtracted from the income of the property, and the residual income is imputed to the land. The value of the land is obtained by capitalizing the constant income.

The land residual technique can also be used with the constant terminal income premise if a typical investor would anticipate a level terminal income stream for the improvements. Income to the improvements is calculated using the appropriate formula, and is deducted from net income to land and buildings. The resulting land income is then capitalized.

The land residual technique is the most sensitive of the residual techniques described here. Land is usually the smaller component of total property value, and errors in determining the income residual to land will result in significant errors in land value. Nevertheless, it is a technique that the appraiser typically uses when appraising land in downtown commercial areas. In these areas, there usually are no bare land sales since all of the property is improved. Consequently, the land residual technique may be the only method of estimating land value. Unless the parcel being appraised was recently improved to its highest and best use, the appraiser must hypothesize such an improvement as a starting point for the land residual technique, for only under these conditions can the assumption be made that cost equals value.

This hypothetical improvement value is used only for the purpose of estimating the income of the property and imputing a residual income to the land. Once this is accomplished, the hypothetical improvement is disregarded. The income imputed to the land is capitalized into land value. This land value, together with the economic rent from the **actual** property, can be used in the building residual technique to appraise the subject parcel.

Great care must be exercised in the land residual technique because an error in imputing income to land will cause a larger error in the final answer than would be the case of a similar error in imputing income to either the building or the property as a whole.

PROPERTY REVERSION

The property reversion technique, which is sometime called the property residual technique, uses two methods of capitalization: a terminating series of income payments and a single income payment. In order to use the property reversion technique, the value of the property at some future date must be estimated. The best future date is usually at the end of the present most profitable use. If there is no building value at that time, the value estimated is that of the land only. In most cases, appraisers use the present value of land as its value at the future date. This is a simplifying assumption that is consistent with the direct capitalization of land income into perpetuity, and in cases of long-lived properties, substantial errors in the estimate of land value have insignificant influences on the final answer.

With the same basic example used in the residual demonstration, and a land value of $20,000 at the end of the present building's economic life, then:

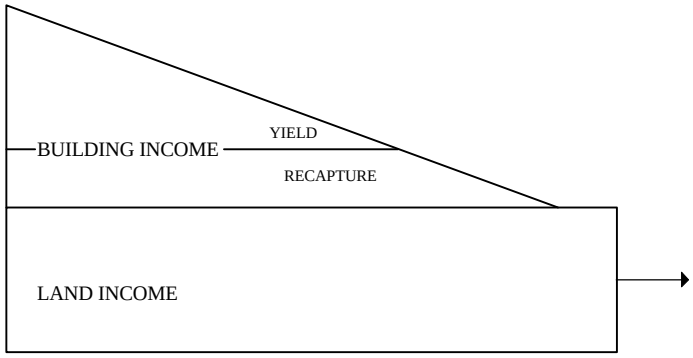
NIBR&T in first year	$ 5,000
Present value of income: $5,000 ÷ .0917 (.0817 + .01)	$54,526
Installment to amortize: $1 @ 8% for 50 years = .0817	
Present value of land revision: $20,000 x .013449*	+ 269
*Present worth of $1 due in 50 years @ 9%	
Total property value	$54,795

The property reversion method converts the future net income into an indicator of value by means of a variation of the annuity capitalization method. To this indicator of value is added the present worth of the land at the end of the economic life of the improvements. The total value indicator essentially is the same as the value derived by the building residual technique, constant terminal income premise. It is not proper to use this technique with a declining terminal income unless the market behavior of investors calls for it.

The graph on the following page shows the future reversionary land value being a continuation of land income beyond the remaining economic life (REL) of the improvements. Even though correct, it can be misleading, because the future reversionary value is a single value at the end of the improvement REL A clearer picture could be painted by using a piece of leased equipment that will have a limited life with a level terminal income and a single future salvage value, which must be discounted to the present.

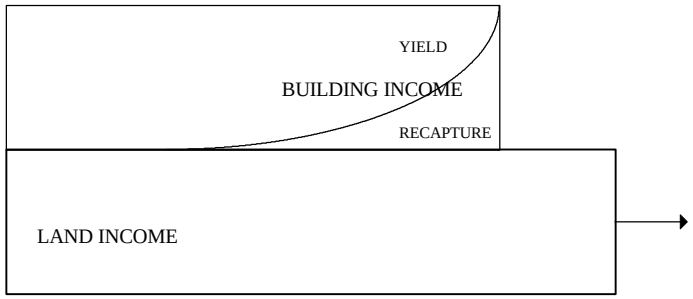
GRAPHIC ILLUSTRATION OF RESIDUAL AND REVERSION TECHNIQUES

RESIDUAL TECHNIQUE with STRAIGHT-LINE DECLINING INCOME:



TIME

RESIDUAL TECHNIQUE with LEVEL TERMINAL INCOME:

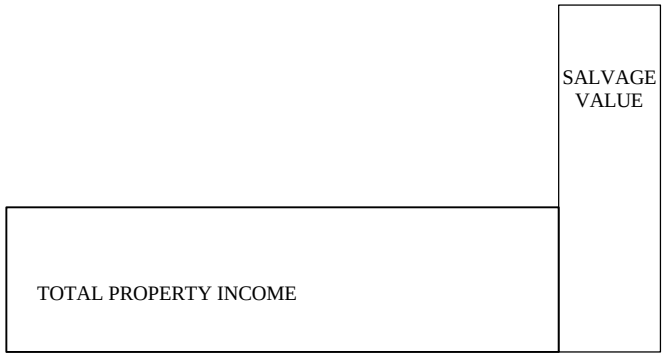


TIME

PROPERTY REVERSION TECHNIQUE with LEVEL TERMINAL INCOME and FUTURE LAND INCOME REVERSION:

TIME

PROPERTY REVERSION TECHNIQUE with LEVEL TERMINAL INCOME and FUTURE SINGLE REVERSIONARY (SALVAGE) VALUE:



TIME

CHAPTER 7: CONCLUSION

The income approach is a good tool for the appraiser, but it must be used with discrimination. If the property to be appraised meets the assumptions of the income approach, and if income and expense forecasts and remaining economic life estimates are accurate, then the income approach produces a valid answer. The answer is full value, provided the appraiser's selections of these items coincides with those of successful bidders for property in the market; however, in real life, all these estimates are matters about which there is some subjectivity. Knowledge of these facts should make the appraiser fully aware of the limitations of the tool and consequently better able to make intelligent use of it.

APPENDICES

MORTGAGE-EQUITY SYMBOLS AND DEFINITIONS

MORTGAGE-EQUITY FORMULAS

SUPPLEMENTARY FORMULAS

APPENDIX 1: MORTGAGE-EQUITY SYMBOLS AND DEFINITIONS

a: A conversion factor such as a sinking fund or a change rate as used in the formula for a capitalization rate $R = Y - \Delta a$.

$a_{\overline{n}|}$: **Present Worth of $1.00 Per Period** For n periods at a specified rate.

app: Appreciation as a fraction of original value or equity investment. In formulas with R_E and r, app relates to increase from original total value to value at investment to ending equity at resale. (See Δ)

B: Denotes building when used as a subscript.

C: **Mortgage Coefficient**: A function of the terms of the mortgage loan, the projected period of ownership and the equity yield rate.

d: **Annual Dividend**: Net annual income earned on real property (before debt service and recapture requirements but after property tax expenses).

d_E: **Equity Dividend**: Cash flow to equity investor after payment of debt service requirement; annual dividend less annual payment of principal and interest on mortgage.

dep: Depreciation as a fraction of original value or equity investment. (See app and also Δ)

Δ: $$\frac{\text{Prop. or Inv. Value at Resale - Beginning Prop. or Inv. Value}}{\text{Beginning Property or Investment Value}}$$

Δ_E: $$\frac{\text{Ending Equity - Beginning Equity}}{\text{Beginning Equity}}$$

E: When used as a subscript, it denotes equity.

f: **Annual Debt Service Constant:** The annual requirement to satisfy principal amortization and interest requirements of a loan expressed as a percentage of indebtedness. It is the same as monthly amount to amortize factors multiplied by 12. Same as R_m.

f_p: Annual debt service constant which would be required to amortize the entire loan within the projection (holding) period. Same as R_{mp}.

I: **Annual Interest Rate:** The annual charge for the use of borrowed capital expressed as a percentage.

i:	**Effective Interest Rate:** The quotient of the annual interest rate divided by the
L:	Denotes land when used as a subscript.
M:	**Mortgage Ratio:** The amount of loan expressed as a percentage of total price or value.
n:	**Term:** Projection or mortgage time period in terms of years, months, quarters, etc.
NIBR:	Net income before a deduction for recapture.
NIBR&T:	Net income before a deduction for recapture and taxes.
O	Denotes overall or total property when used as a subscript.
P:	**Percentage Loan Pay Off:** The percent of loan that is amortized at the end of any given period of time.
p:	Projection period or contemplated period of ownership (used as a subscript). See f_p, R_{mp} and S_p.
r:	**Basic Capitalization Rate:** The portion of the overall capitalization rate that covers all the income requirements except provision for appreciation/depreciation.
R:	In appraisal formulas R typically represents a capitalization rate.
R_B:	Building capitalization rate.
R_E:	Equity capitalization rate. Same as equity dividend rate or cash flow rate. It is the ratio or percentage of the annual equity dividend to the original equity investment.
R_L:	Land capitalization rate.
R_m:	Mortgage capitalization rate. Same as mortgage constant or annual constant.
R_{mp}:	Mortgage capitalization rate for the projection period “p.”
R_o:	Overall capitalization rate.
S:	One dollar plus the interest rate per dollar per period.
S^n:	**Future Worth of One Dollar:** The amount one dollar will grow at a specified interest rate for “n” periods.

$S_{\overline{n}|}$: **Future Worth of One Dollar Per Period:** The future worth of a series of one dollar payments at a specified rate for n periods.

$1/S_{\overline{n}|}$: **Sinking Fund Factor:** The periodic deposit required to accumulate to $1.00 at a specified rate of interest over a term of n years.

S^p: The amount to which $1 will grow with interest at the effective rate during the projection (holding) period.

$S_{\overline{p}|}$: The future worth of equal periodic deposits during the projection period.

V: Value

V^n: The Present Worth of One Dollar discounted at a specified rate for "n" periods.

Y_E: **Equity Yield Rate:** A true annualized rate of return on equity capital including (in addition to average annual dividend) the full effect of any gain or loss from resale at the termination of the investment; a single discount rate which will make the present worth of all the future equity benefits equal the equity investment.

APPENDIX 2: MORTGAGE EQUITY FORMULAS

$C = Y_E + (P \bullet {}^{1}/_{\overline{p}|}) - R_M$

$r = Y_E - (MC)$

$R = r - \Delta\ {}^{1}/_{\overline{p}|}$

$R = Y_E - (MC) - \Delta \bullet {}^{1}/_{\overline{p}|}$

$P = (R_m - I) \div (R_{mp} - I)$

$P = S_{\overline{p}|} / S_{\overline{n}|}$

$P = {}^{1}/_{\overline{n}|} / {}^{1}/_{\overline{p}|}$

$P = (R_m / I - 1)(S^p - 1)$

$R_E = (d\text{-}\$\ R_m) /$ Equity Investment

$V = d/R$

$Y_E = R_E + \Delta_E \bullet {}^{1}/_{\overline{p}|}$

APPENDIX 3: SUPPLEMENTARY FORMULAS

1. The inclining Annuity Income Stream

   a. The annuity increasing at a fixed dollar amount each year where:

      d = income at the end of the first period.

      h = amount of increase of income in dollars.

      n = number of periods.

      a_n = present worth of $1.00 per period.

      I = interest or discount rate.

Therefore:

Present value = $(d + hn)\ {}^{a}\overline{n|} - h(n - {}^{a}\overline{n|}) / 1$

   b. The annuity increasing at a constant ratio each year where:

      I = the annual discount rate

      x = the ratio of increase in income for any year to the previous year

      n = number of periods

      The first year income is $1.00

$$\text{Present worth} = \frac{1 - \frac{(1+x)^n}{(1+I)^n}}{I - x}$$

2. The Declining Annuity Income Stream

   a. Annuity decreasing at a fixed dollar amount each year where:

      d = income at the end of the first period

      k = annual amount of decrease in dollars

      n = number of periods

      a_n = present worth of $1.00 per year

      I = interest or discount rate

Present worth = $(d - kn)\ a_{\overline{n}|} + k(n - a_{\overline{n}|}) / I$

b. Annuity decreasing at a constant ratio each year where:

I = the annual discount rate

x = the ratio of decrease in income for any year to the income for the previous year

n = number of periods

The first year income is $1.00

$$\text{Present Worth} = \frac{1 - \frac{(1-x)^n}{(1+I)^n}}{I+x}$$

GLOSSARY

Amortization:

The process of recovery of invested capital through a scheduled, systematic repayment of the principal.

Annual Debt Service Constant:

Total annual debt service expressed as a percentage of the original loan amount that is required for repayment of a loan that has equal periodic payments. It can be level, increasing, decreasing or a combination thereof.

Annuity:

A periodic series of payments. It can be level, increasing, decreasing or a combination thereof.

Appreciation:

Increase in value of property due to increase in cost to produce or market demand, improved economic conditions, etc.

Band of Investment:

A method of estimating a capitalization rate. It is based on the premise that return on investment is comprised of the weighted cost of debt and equity capital.

Capitalization:

Any method of converting expected future benefits into an indicator of value; the discounting of future income into a capital sum.

Capitalization Rate:

Rate which is used in converting income into an indicator of value. A ratio that expresses a relationship between income and value.

Cash Flow:

Net income, usually annual, which remains after deducting all expenses including debt service for the loan on the property; equity dividend; cash throw off; is usually an annual flow of cash, positive or negative, before deduction of income taxes.

Cash Flow Rate:

The ratio of annual cash flow to the original equity investment (down payment); equity dividend rate; cash on cash.

Compound Interest:

Interest on the sum of a principal amount plus the accrued interest combined at regular intervals; interest on interest.

Contract Rent:

The actual amount of rent a property is earning. The existing rent on property as distinguished from rent that could be expected if the property were available for rent on the open market.

Depreciation:

A loss in value from any cause. The difference between RCN and market value.

Discount Rate:

The rate of return on investment in property.

Economic Rent:

The amount of rental income which could be expected from a property if available for rent on the open market. It is indicated by the prevailing open market rental rates for comparable assets, terms, and conditions as distinguished from contract rent which exists on the subject property at the time of the appraisal.

Effective Gross Income:

The estimated potential gross income less allowances for vacancies and collection losses.

Effective Interest Rate:

Interest on one dollar per period as distinguished from nominal annual interest rate; the nominal annual interest rate divided by the number of compounding periods per year.

Equity Dividend:

That portion of net income remaining after payment of debt service; cash flow to the equity investor; same as cash flow dividend.

Equity Yield Rate:

A true annualized rate of return on invested equity capital including the average annual dividend plus the gain or loss from resale at the termination of the investment; a single discount rate which will make the present worth of all the future equity benefits equal the equity investment.

Expense Ratio:

The ratio of expenses to gross income.

Factor:

A multiplier. A capitalization factor is the reciprocal of a capitalization rate.

Gross Income Multiplier:

The relationship between sales price (or value) and gross income, expressed as a factor; used to estimate value as a multiple of income, usually, though not necessarily, annual income. Gross income is income to the property from all sources. In an apartment property, for example, the gross income could be the sum of living unit rent, parking space rent, vending machine income and laundry facility income.

Gross Rent Multiplier:

The relationship between sales price (or value) and gross rent, expressed as a factor; used to estimate value as a multiple of income, usually, though not necessarily, monthly income. Gross rent is income to the property only from rent from the principal improvement (s). In an apartment property, for example, the gross rent would be from living units only and would exclude income from parking space rent, vending machine income and laundry facility income.

Highest and Best Use:

The most probable use of a property at the time of appraisal. It may also be defined as that available use and program of future utilization which produces the highest present land value.

Holding Period:

The term of ownership for an investment.

Interest Rate:

The rate of return on borrowed money.

Interest Only Loan:

A non-amortizing loan for which the lender receives only interest payments during the term of the loan and recovers all of the principal in a lump sum at the end of the term.

Internal Rate of Return:

The annualized rate of return on invested capital which is generated or is capable of being generated internally during the period of ownership. It is similar to the equity yield rate and is often used as a measure of profitability after income taxes.

Investment Value:

Value to a particular investor based upon individual investment requirements as distinguished from the concept of market value.

Interpolation:

The calculation of a quantity within a range of data; the process of approximating an intermediate value which falls between tabular entries in a set of tables.

Inwood Annuity Capitalization:

A method of converting equal periodic payments into present value.

Iteration:

A mathematical process of solving for an unknown quantity by trial and error, starting with a trial quantity and approaching the solution with a series of repetitive calculations until the error is negligible.

Leaseback:

A transaction in which an investor purchases property and then leases it back to the seller.

Leased Fee:

The lessor's interest in property; the right to receive rent stipulated in the lease and to receive the property back (reversion) at the end of the lease period.

Leasehold:

the lessee's interest; the right to use and occupy the real property during the term of the lease, subject to any contractual restrictions.

Lessee:

One who possesses the right to use or occupy property under a lease agreement; a tenant.

Lessor:

One who holds title to and conveys the right to use and occupy property under a lease agreement; a landlord.

Leverage:

The use of borrowed money to magnify profits resulting from return on capital.

Loan Ratio:

The ratio of the amount of a loan to the amount of purchase price.

Mortgage Constant:

The total annual payments required to pay off an amortizing loan with level monthly payments, expressed as a percentage of the original loan amount. Mortgage constant tables may be found in Assessors' Handbook Section 505.

Net Lease:

A lease where the lessee pays not only for the use of a property, but also for stipulated additional charges such as property taxes, insurance, and maintenance. Although not recommended, common terminology of “net net lease” and “net net net lease” is used to denote the degree of “netness” of the lease.

Net Income Before Recapture and Taxes (NIBR&T):

Annual net income remaining after deducting all operating expenses but before deducting financial charges such as recapture, debt service and property taxes. For property tax appraising, it is this figure that is capitalized into an indication of value using various techniques.

Operating Expenses:

Expenses necessary to continue the flow of income from the operation of a property.

Ordinary Annuity:

A stream of income with payments at the end of specified regular time intervals (in arrears) as distinguished from an annuity with payments made at the beginning of each time interval (annuity in advance).

Overage Income:

Rental income over and above a guaranteed minimum amount in a lease requiring additional rent under certain circumstances, such as when a tenant shows profits beyond a specific dollar amount.

Overall Rate:

The relationship between the anticipated net income before deducting for recapture (NIBR) and the sales price. The rate includes the investors’ perception of both interest on and recapture of the investment.

Principal:

A capital sum; payment which represents reduction of capital loaned as distinguished from payment of interest on the balance owed.

Projection Period:

Holding period; a period of time over which net income is projected for valuation purposes. A presumed period of investment in property.

Recapture:

The return of invested capital. In real estate investments, capital may be returned in many ways. It may be recaptured gradually as a part of the annual income, it may be recaptured all or in part through resale of the property, or combinations of both. It is the variety of the methods of recapture which require the various capitalization techniques.

Reversion:

The return of real property rights to the lessor at the end of the expiration of a lease. The estate returned or due to be returned. Property that remains at the end of a terminal income stream.

Risk Rate:

The portion of the annual rate of return on invested capital that is assumed to cover the risks pertinent to the particular investment.

Safe Rate:

The interest rate that can be obtained with maximum safety and minimum risk.

Sub-lease:

An agreement to lease a property from a lessor who is a lessee under a prior agreement.

Tax Shelter:

Tax benefits to be derived from certain investments in the form of additional deductions from taxable income without reduction in actual income.

Weighted Average:

An average in which each component is adjusted by a factor which reflects its relative importance (weight) in the whole. The products are added up and divided by the number of products. In mortgage equity (Akerson method without algebra), the weighted rate is a band of investment made up of the debt cash flow and the equity yield rate, unadjusted for equity build-up, appreciation or depreciation.

Yield:

An anticipated rate of return on an investment in capital goods, or the rate that was actually achieved.

BIBLIOGRAPHY

American Institute of Real Estate Appraiser. *The Appraisal of Real Estate*. Seventh ed., Chicago, IL., 1978.

Akerson, Charles B., *An Introduction to Mortgage Equity Capitalization* (AIREA). 2nd ed., Cambridge, Massachusetts: Ballinger Publishing Company, 1973

Akerson, Charles B., *Capitalization Theory and Techniques, Study Guide* (AIREA), Third Printing, Chicago, IL, 1983.

Ellwood, L.W., *Ellwood Tables for Real Estate Appraising and Financing*. Fourth ed., Cambridge, MA., Ballinger Publishing Co., 1977

Kinnard, W.N., Jr., *Income Property Valuation*. Lexington, MA., Heath Lexington Books, 1977.